

WHAT IS CLAIMED IS:

1. A source wire for treating tissue within a patient's body by localized in vivo radiation of tissue at a target site from a radioactive source of the source wire, the source wire being introducible by applicator to the target site via an implanted catheter or a natural vessel, duct or chamber of the patient's body that provides a pathway or portion of a pathway to the target site from a point external to the body, said source wire comprising:

an elongate wire composed of nickel-titanium alloy, having preselected properties of flexibility, springiness, slipperiness, mechanical strength and shape memory retention, said elongate wire having a proximal end and a distal end, and

a radioactive source assembled with said elongate wire at the distal tip thereof for delivery through said pathway to the target site by loading and advancing the elongate wire along the pathway from the proximal end of the elongate wire, until the source is disposed at the target area for irradiating the selected tissue.

2. The source wire of claim 1, wherein:

the elongate wire is a solid lead of substantially uniform thickness along its entire length.

3. The source wire of claim 1, wherein:

the elongate wire is a cable composed of a multiplicity of strands of substantially

uniform thickness throughout the entire length of each strand, each strand having a distal end and a proximal end.

4. The source wire of claim 3, wherein:

the distal end of at least some of the strands is set back relative to the distal end of the elongate wire and to the distal end of other strands of the cable, to form a taper that narrows from a point short of the distal end of the wire to the distal end of the wire, for ease of entry into portions of the pathway of reduced size.

5. The source wire of claim 2, wherein:

the elongate wire has an axial hole of predetermined depth at its distal tip,
the source is disposed in said axial hole, and
a plug is fastened to the distal tip of the elongate wire to seal said axial hole with the source disposed therein.

6. The source wire of claim 5, wherein:

the source comprises an iridium isotope that has been irradiated to a predetermined radioactivity level for treatment of the tissue in the target area.

7. The source wire of claim 6, wherein:

the source comprises a plurality of segments of said iridium isotope.

8. The source wire of claim 6, wherein:

the iridium isotope has a radioactivity level of at least one curie.

9. The source wire of claim 6, wherein the tissue to be treated is a malignant tumor, and

the iridium isotope source has a radioactivity level of approximately 10 curies.

10. The source wire of claim 9, wherein:

the elongate wire has a diameter less than approximately 0.028 inch.

11. The source wire of claim 6, wherein the tissue to be treated is an interior surface of a vascular wall which has been subjected to trauma by prior treatment to reduce the presence of plaque, and

the iridium isotope source has a radioactivity level in the range of approximately 1 to 2 curies.

12. The source wire of claim 11, wherein:

the elongate wire has a diameter less than approximately 0.021 inch.

13. The source wire of claim 1, wherein:

the elongate wire is an assembly of a tube and a solid backbone wire running the entire

length of the tube except for a displacement of the end of the backbone wire relative to the same end of the tube to form an axial hole of predetermined depth to accommodate radioactive source material therein, and

a plug fastened over the open end of the axial hole to securely seal the source material therein.

14. A method of treating smooth muscle cell tissue within the body of a patient, using a radioactive source wire, comprising the steps of:

implanting a catheter in the patient to provide a pathway from a point external to the patient's body to a point at or near a predetermined target area about the patient's heart for the tissue to be treated,

advancing a source wire including an elongate lead having a distal end with a radioactive source thereat and a proximal end from which the source wire is advanced, through the catheter by limiting the elongate lead to a sufficiently small diameter to carry the radioactive source to the immediate vicinity of the tissue for irradiation thereof in the target area, having selected the elongate lead to be sufficiently flexible and mechanically strong to traverse the catheter without substantial kinking while resisting breakage,

halting the advance of the source wire through the catheter when the distal end reaches the point at which the source wire is to irradiate tissue in the target area,

irradiating the targeted tissue for a predetermined interval of time, and

withdrawing the source wire from the catheter immediately upon completing the

irradiation of tissue for the duration of the interval.

15. The method of claim 14, wherein the target area is a coronary artery, and further including:

centering the distal tip of the source wire in the coronary artery to produce substantially uniform irradiation of the radioactive tissue adjacent the source,

16. The method of claim 15, further including:

performing the irradiation substantially immediately after the coronary artery has been subjected to opening of the lumen by reduction of the thickness of plaque on the interior surface of the wall of the artery, to produce substantially uniform irradiation of the radioactive tissue adjacent the source, and thereby reduce the likelihood of restenosis of the irradiated interior surface of the artery wall.